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HATCHING AND REARING OF CHICKS AS A SUBJECT OF INSTRUCTION IN SECONDARY SCHOOLS.

INTRODUCTION.

Throughout the United States an interest is being aroused in poultry in connection with the teaching of agriculture. Progressive teachers are beginning to appreciate the educational value of practical projects in connection with their teaching. Poultry fits in well with the project plan. As there are few boys and girls who can not keep a few fowls at home, so there are few students who will not develop an interest in poultry if the subject is approached in the right manner. If the classroom lessons are made to fit around actual work either at home or at school there will be no lack of interest.

Many important principles underlying feeding and improvement may be learned by the student of poultry production which may be applied to larger animals. The extent of the poultry course will depend upon the school and its students. In some districts a regular course in poultry husbandry is given, while in others but a few lessons are given in connection with animal husbandry or general agriculture. In the treatment of the subject which follows it is assumed that the classroom instruction will be centered around practical work. Where it is impossible to secure equipment, the subject may be treated in one or more lessons in connection with practical work at home.

ARTIFICIAL INCUBATION.

The incubator.—It is possible that a new incubator may be secured for use at the school from one of the poultry supply houses without cost. A well-built, standard machine should be secured, though it need not be large. If it is impossible to secure a new machine, one which has been used may be borrowed or rented. Arrangements should be made for the incubator early in the spring before the hatching season. At this time the students will be interested in securing catalogues of incubators and learning from them about different types and makes of hatching machines. If a new incubator is secured, directions for setting it up

will accompany it. In setting it up under the direction of the teacher the students will learn much about the construction of the machine. If a hot-air incubator is secured, the hot-water machine should be explained by some member of the class and the merits of the two types compared. [Although the better incubators are well insulated, there is still a possibility of fire. It is better, therefore, to have the incubator away from the main school building. If it is brought into an insured building this should be done with the permission of those controlling the insurance. In any case, the incubator while in operation should be under the constant supervision of the instructor, both on account of possible danger of fire from careless management and to insure the uniform temperature so necessary for the successful hatching of the eggs.]

Eggs for hatching.—Eggs for hatching may be brought by the students or secured from a reliable breeder. In connection with securing eggs the following topics should be developed: (1) Causes of infertility, (2) care of eggs for hatching, (3) selection of hatching eggs with regard to size, shape, and color, and (4) methods of packing and shipping eggs for hatching.

Operating the incubator.—At regular laboratory periods all of the students may take part in exercises connected with artificial hatching of chicks, but two or three students should be made responsible for the hatch, one of them being especially responsible for the temperature. These students may report at each class the work they have done.

In setting the incubator in operation, the students will be impressed first with the necessity of starting the machine and getting a uniform temperature before the eggs are placed within it.

The lamp will receive attention next. The importance of filling daily with good oil should be emphasized as well as the necessity for keeping the wick well trimmed. The lamp should be cared for after turning the eggs to avoid getting oil upon them. The students should be questioned as to why the oil will injure the hatching egg.

A discussion of the principles underlying the regulation of temperature in an incubator illustrates well the necessity for correlating agriculture with other sciences. Why should a uniform temperature of 103° be maintained? Why does it take less heat from the lamp to maintain the temperature later in the hatch than at the beginning? Why does the temperature go down after the eggs are placed in the trays? Such questions will aid in bringing out the biological and physical principles involved. The physical and mechanical principles underlying the working of the thermostat should be made clear. The manner in which insulation and a uniform distribution of heat is secured should also receive attention.

While provision for supplying moisture and for ventilation may be noted at this time, the necessity for the proper amount of moisture and for good ventilation should be emphasized as hatching progresses and the need for these essentials is more urgent.

Directions for turning and cooling the eggs will accompany the incubator. Be sure the students understand the purpose of this operation. Each student should be given practice in turning and in determining when the eggs are ready to be placed back in the machine.

The testing of the eggs on the seventh and fourteenth days is essential to success. A great deal of interest will center around this testing as it shows the development of the embryo. If the teacher desires to show this most interesting process in a better way shells may be broken and the embryo noted at different stages. In the testing attention should be given the air cell as an indication of the moisture needed.

The importance of regularity and attention to details should be emphasized. Each student should keep a careful record of the work from the time the eggs are placed in the machine until the chicks are taken out. A record of the temperature, taken three times each day, is of special importance.

The students may be overzealous if there is a good hatch and desire to handle the chicks and take them out of the machine too soon. The incubator should be kept dark and the doors

kept closed until the hatch is completed, when it will be necessary to open the ventilators wide and wedge the door open a trifle. The discussion at this time should bring out the reasons for keeping the machine dark and the necessity for extra ventilation. The chicks should be left in the incubator from 24 to 36 hours before removing them to the brooder. It will be profitable to raise the questions: Why can newly hatched chicks go so long without food? Why may it prove harmful to feed them too soon?

A poor hatch will prove discouraging, yet it is not without value to the students. They should check up their records carefully and if nothing in the operation of the machine would indicate sufficient cause for failure they should look more closely into the source of the eggs and determine if the breeding stock was in condition to produce strong fertile germs. The eggs may have been handled carelessly before incubation began.

After the chicks have been taken from the machine it should be cleaned thoroughly and disinfected. The importance of cleanliness and sanitation can not be emphasized too strongly.

HATCHING WITH HENS.

If a flock of fowls is kept at the school some hens should be set, even though an incubator is operated. For various reasons many of the students will use hens for hatching. All that is learned in connection with incubator management concerning the eggs will apply to hatching with hens. Attention may now be centered upon the broody hen and her management, which may be considered under the following topics: (1) Relation of sitting and brooding qualities to breed; (2) how to make a nest; (3) special quarters for sitting hens and arrangement of nests; (4) how to tell when a hen is ready to sit; (5) how to set a hen; and (6) care and management of sitting hens.

In discussing these topics emphasis should be placed upon a definite system, regularity in care and feeding, in cleanliness, and in the prevention of pests.

ARTIFICIAL BROODING.

The brooder.—If a small indoor brooder or hover was not secured with the incubator, one should be obtained and set in operation before the chicks are ready to be removed from the incubator. The brooder itself should arouse interest in the students, which will lead them to learn a good deal concerning various types of brooders and brooding systems. Students should be encouraged to plan and construct brooders of their own.

Management of chicks.—The management of the brooder will be based upon the needs of the chicks. It is important, therefore, that the students study the chicks and their requirements carefully. They will learn that no definite temperature can be given for the brood chamber as for the egg chambers. Chilling, overheating, and overcrowding often prove disastrous. If these calamities are to be avoided and if the chicks are kept comfortable the students will learn that the heat of the brooder must be adjusted to climatic and weather conditions as well as to the age of the chicks. The chicks must be given plenty of exercise at all times, which means that as they get larger additional room must be provided.

If the chicks are taken from a new incubator to a new brooder there should be little danger from such pests as lice and mites. The importance of cleanliness should be emphasized again. A layer of sand upon the brooder floor will aid in sanitation if it is changed often.

Feeding the chicks.—As in the case of brooding, success in feeding will depend upon a study of the requirements of the chick and the adaptation of the feed to its age and development. Although small chicks should be fed often, they should not eat a great deal at a time. There is more danger in overfeeding than in underfeeding. They should have before them at all times a supply of fresh, clean water, charcoal, and grit. While prepared chick feeds may be obtained

and may prove satisfactory, the students should prepare rations needed by chicks at different periods of growth. They should not lose sight of the importance of a supply of green feed for chicks which are confined.

Disposal of chicks.—If no provision has been made for maintaining poultry at the school it will be best to dispose of the chicks at the time they are ready to be moved outside, after the management of the indoor brooder has been demonstrated. If they are to be taken home by the students who furnished the eggs it will be necessary at the time of hatching to distinguish them by some system of toe punching or banding.

BROODING WITH HENS.

Hens may be used for hatching and their chicks reared in a brooder, or chicks hatched in an incubator may be reared by hens. If it is deemed advisable not to use a brooder at the school the chicks may be taken care of by students who have hens which want to sit. Such hens may be tried out with a few eggs and the eggs replaced by the chicks at night. Students may get a start in fowls of good breeding by buying day-old chicks and rearing them with hens.

It is the more general practice, however, to depend upon hens to rear the chicks which they have hatched. While the same principles underlie the rearing of chicks whether they are in a brooder or with a hen, there are different points in management which need emphasis. Chicks with hens are in greater danger of becoming infested with lice and mites. If the hen is allowed free range with her chicks there are numerous factors which may result in loss of chicks. The discussion should bring out the causes of this loss.

A discussion of the following topics should bring out the important points in the management of hen and chicks: (1) Care at time of hatching, (2) prevention of lice and mites, (3) construction of brood coops, (4) confinement in coops *v.* free range, and (5) management of hens and chicks in coops.

A discussion of the feeding of the hen may be brought out in the last topic, the feeding of the young chicks having been brought out under artificial brooding. As the chicks get older their feeding will depend upon what they are to be used for. The subject of feeding fowls may be discussed in a future lesson on the production of eggs and market poultry.

SUGGESTIVE PRACTICUMS.

(Work to be done at school.)

1. Making egg tester and testing eggs.
2. A study of the developing embryo.
3. Making of nest box and nest for sitting hen.
4. Making of brood coop.
5. Making of drinking fountain and feed hopper.
6. Visit to poultry farm or general farm where modern methods of hatching and rearing chicks are practiced. This trip should be made with a definite object in view. Students should make a detailed report of what is done.

SUGGESTIVE PROJECTS.

(Work to be done at home.)

1. Hatching and rearing of chicks with hens.
2. Use of incubator and brooder in hatching and rearing of chicks.
3. Production of eggs for hatching from purebred fowls.
4. Production of day-old chicks for sale.

NOTE.—This work may be correlated with the work of the poultry clubs.

REFERENCES.

- Lewis, H. R. Poultry Keeping. Philadelphia, Pa., J. B. Lippincott Co., 1915.
 Robinson, J. H. Domestic Birds. Columbus, Ohio, Ginn & Co., 1913.
 Brigham, A. A. Progressive Poultry Culture. Cedar Rapids, Iowa, Torch Press, 1907.
 Poultry Management. U. S. Dept. Agr., Farmers' Bul. 287 (1907).
 The Organization of Boys' and Girls' Poultry Clubs. U. S. Dept. Agr., Farmers' Bul. 562 (1913).
 Natural and Artificial Incubation of Hens' Eggs. U. S. Dept. Agr., Farmers' Bul. 585 (1914).
 Natural and Artificial Brooding of Chickens. U. S. Dept. Agr., Farmers' Bul. 624 (1914).

NEWS ITEMS.

CONFERENCES ON SECONDARY AGRICULTURAL EDUCATION.

For some time there has been a feeling among those directly interested in secondary agricultural education that it would be a good thing to get together and discuss the problems that deal with this particular subject. There are a number of general organizations in which subjects pertaining to secondary agriculture are discussed, but at none of their meetings has there been an opportunity for the full and free discussion that would be possible in a smaller, special conference. Inasmuch as special problems are presented in different sections, it was decided to call special conferences for the important agricultural districts of the United States.

Conference at Columbus, Ohio.—The first of these conferences was called by the Agricultural Education Division of this office, at Columbus, Ohio, February 22, 1915. At this meeting there was a good representation of men from the North Atlantic States who are interested in the teaching of agriculture in secondary schools. The following subjects were discussed:

1. What shall be required in the course of study for teachers of secondary agriculture?
2. Proper preparation and equipment, academic and professional, of teachers in schools of agriculture.
3. Most valuable lines of agriculture to be pursued in secondary schools and to what extent should they extend?
4. Methods and agencies in teaching agriculture in the secondary schools.

Resolutions were carried at the end of the conference to the effect that the district conferences be continued, two conferences each year, one during the month of November in connection with the meeting of the Association of American Agricultural Colleges and Experiment Stations, and the other to be held at the discretion of this office.

Conference at Chattanooga, Tenn.—A similar conference was held at Chattanooga, Tenn., April 26, 1915. Those attending this meeting represented men interested in secondary agricultural education in the Southern States. The discussion of the following subjects was given a distinct bearing upon problems which are being met in the South:

1. Most valuable lines of agriculture to be pursued in secondary schools and to what extent should they extend?
2. What shall be required in the course of study for teachers of secondary agriculture?

There were also short reports from State officials on the successes and failures of the year, and the adoption of resolutions for the good of secondary agricultural education during the coming year.

OTHER ITEMS OF INTEREST.

Employment of teachers of agriculture in high schools for 11 months of the year.—Recent instructions concerning home projects issued from the office of the State superintendent of Wisconsin to teachers of agriculture in the high schools of that State give the following suggestions concerning the employment of teachers:

"School boards are especially urged to arrange with their agricultural instructors for service during an 11 months' year. The summer is the most important part of the year for the

supervision of the practical side of the work, without which the course can not be considered satisfactory. Experience has shown that the greatest success of these courses can not be assured without this 11 months' arrangement."

Occupation of agricultural college graduates.—The News Letter of the College of Agriculture of Ohio State University of March 27, 1915, has the following concerning the occupation of graduates of the agricultural college:

"Investigation has shown that 38 per cent of the graduates of the Ohio Agricultural College from the years 1908 to 1913 go direct to the farm. The teaching profession claims the largest number outside those returning to the farm. Teaching in high schools, colleges, and universities claims 25 per cent of the graduates. The United States Department of Agriculture and various State experiment stations utilize 17 per cent. The other 20 per cent are employed by landscape gardeners, weather bureaus, commercial enterprises such as fertilizer companies, farm implement firms, packing houses, live stock exchanges, etc. It is thus seen that while many students do not return immediately to the soil, they engage in agricultural work or occupations closely allied to agriculture."

SUGGESTIONS CONCERNING THE MONTHLY WILL BE WELCOMED.

The next issue of this monthly will not be sent out until September. The Agricultural Education Division will be grateful for any suggestions as to ways and means of making this publication serve the teachers of agriculture in secondary schools better. Are the interests of teachers served better by furnishing subject matter or by discussing methods? Do you prefer a discussion of methods in a general way or their application in the treatment of a concrete lesson topic? Please let us know what you need most.

RECENT AGRICULTURAL BOOKS.

- Bailey, L. H. *The Principles of Fruit Growing*. New York, The Macmillan Co., 1915, 20. ed. rev.
 Quear, Chas. L. *Soils and Fertilizers for Public Schools*. [Muncie, Ind.], Author, 1915.
 Cromwell, Arthur D. *Agriculture and Life*. Philadelphia, Pa., J. B. Lippincott Co., 1915.
 Alderman, L. R. *School Credit for Home Work*. Boston, Houghton, Mifflin Co., 1915.

